

Automatic interpretation algorithms of chest radiography in tuberculosis

Subhashree C¹, Subathra Devi A², Sinddhu M³

¹Professor, Department of Radiology, Government Medical College and ESIC Hospital, Coimbatore, Tamil Nadu, India.

^{2,3}Department of Radiology, Government Medical College and ESIC Hospital, Coimbatore, Tamil Nadu, India.

Mass screening and rapid diagnosis of tuberculosis (TB) is a difficult task in developing countries like India. To address this difficulty, many artificial intelligence tools and deep learning methods are used as an automated TB detection system to simplify the diagnosis of tuberculosis and assist clinicians in confirming the severity of disease and treatment execution. Upon reviewing the recent evidences for using automated interpretation in tuberculosis screening and diagnosis by radiological methods, here are the few evidences of its usage suggesting it as a valuable tool for clinicians in assessing patients with tuberculosis. Soares et al demonstrated that chest X-ray automated interpretation algorithms were significantly correlated with sputum bacillary load in mass screening of tuberculosis [1]. Yan et al demonstrated a moderate to strong correlation in diagnostic performance between clinician and AI model based on chest computed tomography [2]. Ma et al. developed an AI tool for automatic detection of patients with active tuberculosis (ATB) and distinguish between ATB and non-ATB cases with chest computed tomography (CT) [3]. Currently more than 55 commercial (CE-marked) artificial intelligence algorithm-based devices are available for chest radiography [4-6]. Recently Kazemzadeh et al demonstrated the efficiency of deep learning system in the detection of active pulmonary TB in 1,65,754 images of 22,284 subjects spanning five countries (India, China, United States, Zambia and South Africa) [7]. Further multicentre prospective studies were needed to validate and generalize these algorithms for clinical implementation in India. Hence, it is important for us to lead this new era radiology powered by artificial intelligence.

Financial support and sponsorship:

Nil.

Conflict of interest:

There are no conflicts of interest.

Edited & Reviewed by

Dr. S Charles Bronson,

Stanley Medical College, Chennai, India.

REFERENCE :

1. Soares, T.R.; de Oliveira, R.D.; Liu, Y.E.; Santos, A.D.S.; dos Santos, P.C.P.; Monte, L.R.S.; de Oliveira, L.M.; Park, C.M.; Hwang, E.J.; Andrews, J.R.; et al. Evaluation of chest X-ray with automated interpretation algorithms for mass tuberculosis screening in prisons: A cross-sectional study. *Lancet Reg. Health-Am.* 2023, 17, 100388.
2. Yan C, Wang L, Lin J, et al. A fully automatic artificial intelligence-based CT image analysis system for accurate detection, diagnosis, and quantitative severity evaluation of pulmonary tuberculosis. *Eur Radiol.* 2022;32(4):2188-2199. doi:10.1007/s00330-021-08365-z
3. Ma L, Wang Y, Guo L, et al. Developing and verifying automatic detection of active pulmonary tuberculosis from multi-slice spiral CT images based on deep learning. *J Xray Sci Technol.* 2020;28(5):939-951. doi:10.3233/XST-200662
4. Van Leeuwen, K.G., Schalekamp, S., Rutten, M.J.C.M. et al. Artificial intelligence in radiology: 100 commercially available products and their scientific evidence. *Eur Radiol* 31, 3797–3804 (2021). <https://doi.org/10.1007/s00330-021-07892-z>
5. Diagnostic Image Analysis Group AI for radiology: An implementation guide 2020. [(accessed on 30 January 2023)]. Available online: <https://grand-challenge.org/aiforradiology/>
6. Zhan Y, Wang Y, Zhang W, Ying B, Wang C. Diagnostic Accuracy of the Artificial Intelligence Methods in Medical Imaging for Pulmonary Tuberculosis: A Systematic Review and Meta-Analysis. *J Clin Med.* 2022 Dec 30;12(1):303. doi: 10.3390/jcm12010303. PMID: 36615102; PMCID: PMC9820940.
7. Kazemzadeh S, Yu J, Jamshy S, Pilgrim R, Nabulsi Z, Chen C, Beladia N, Lau C, McKinney SM, Hughes T, Kiraly AP, Kalidindi SR, Muyoyeta M, Malemela J, Shih T, Corrado GS, Peng L, Chou K, Chen PC, Liu Y, Eswaran K, Tse D, Shetty S, Prabhakara S. Deep Learning Detection of Active Pulmonary Tuberculosis at Chest Radiography Matched the Clinical Performance of Radiologists. *Radiology.* 2023 Jan;306(1):124-137. doi: 10.1148/radiol.212213. Epub 2022 Sep 6. PMID: 36066366.

*Correspondence at Dr. Subhashree C, Professor, Department of Radiology, Government Medical College and ESIC Hospital, Coimbatore, Tamil Nadu, India. Email: subhakaths@gmail.com

Cite: Subhashree C, Subathra Devi A, Sinddhu M. Automatic interpretation algorithms of chest radiography in tuberculosis. *The Journal of Medicine and Science* 2023; 02(01): 01.

© 2023 The Author(s). This is an open access article under the CC-BY license. (<https://creativecommons.org/licenses/by/4.0/>)